October 8, 2003

Commissioners:

This comment is along the lines of: Be good, but if you can't be good, be careful. From the standpoint of electromagnetic compatibility with HF (& low VHF) radio receivers (and possibly transmitters), BPL is not a good idea.

> In its comments in response to the FCC NOI, the [American Radio Relay] League characterized BPL as "a Pandora's Box of unprecedented proportions" and said the Commission's Part 15 rules "should be modified so as to prevent interference to users of the HF and low VHF spectrum" from the outset.[1]

In my own comments in response to the FCC NOI, I characterized BPL as "a monster" along the lines of a Trojan horse, and recommended prohibiting its implementation at this time.

If you can't be good, then let's be safe. You requested comment on whether to send BPL along parallel transmission lines or single or common mode with respect to ground. For safety's sake, I believe it should only be allowed on lines with a grounded neutral. I refer you to ANSI C114.1-1973 / IEEE Std 142-1972:

> **1.3.13 Resonant Conditions**[2] An ungrounded system may be subjected to resonant overvoltages. With the high phase-to-ground capacitance of larger systems, there may be a condition of approximate circuit resonance during a line-to-ground fault through an inductance such as a faulty coil in a motor starter. The voltage to ground of the unfaulted phases will then be considerably in excess of line-to-line voltage. An overvoltage due to resonant or near-resonant conditions can be encountered on a small system where tuned inductive-capacitance circuits are used for such purposes as operation of welders. For example, if the welder is equipped with a series capacitor for power factor improvement, the voltage across the capacitor and across the transformer winding are each many times the supply line-to-line voltage. A fault between the capacitor and the welder transformer imposes this high voltage on the insulation of the ungrounded system. A grounded-neutral system would prevent this overvoltage by holding the phases to their approximate normal voltage to ground.

Access BPL will employ some kind of device to bypass the distribution transformer, with insulation according to the line voltage. We wouldn't want to have a voltage largely in excess of that line voltage on our device, so I recommend specifying grounded neutrals for safety. Such an overvoltage condition might happen rarely enough that it wouldn't have shown up on the BPL tests. Forewarned is forearmed.

[1] The ARRL Letter, Vol. 22, No. 38, September 26, 2003 * ARRLWeb <http://www.arrl.org/arrlletter/>.

[2] IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems, *Sponsor*: Industrial and Commercial Power Systems Committee of the IEEE Industrial Applications Society, Approved June 21, 1973, American National Standards Institute. 

There is another condition to watch out for:

**1.3.14 Restriking Ground Faults**[3] Field experience and theoretical studies have shown that arcing, restriking, or vibrating ground faults on ungrounded systems can, under certain conditions, produce surge voltages as high as six times normal. The conditions necessary for producing these overvoltages require that the dielectric strength of the arc path build up at a higher rate after each extinction of the arc than it did after the preceding extinction. This phenomenon is unlikely to take place in open air between stationary contacts because such an arc path is not likely to develop sufficient dielectric recovery strength. It may occur in confined areas where the pressure may increase after each conduction period. Neutral grounding is effective in reducing transient voltage buildup from such intermittent ground faults by reducing neutral displacement from ground potential and reducing destructive effectiveness of any high frequency voltage oscillations following each arc initiation or restrike.

Here we would have not only the higher a.c. voltage on the insulation of the bypass device, but possibly "destructive effectiveness of any high frequency voltage oscillations following each arc initiation or restrike." Depending on the frequency characteristics of the bypass device and the frequency of the oscillations, some of that excess juice might get bypassed on through, and we sure wouldn't want that. The precaution is the same: ground the neutral.

My recommendation is we not proceed to implement BPL at this time. But if we can't be good, let's use protection--ground the neutral.

Respectfully Submitted,
Earl S. Gosnell III

[3] ibid.